



**Bushland Protection
Systems Pty Ltd**
Specialising in
**BUSHFIRE HAZARD
PLANNING & MITIGATION**

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**SUB-PRECINCT SPECIFIC
BUSHFIRE HAZARD ASSESSMENT
AND MITIGATION PLAN**

FOR

**SUB-PRECINCT 3B & 3C
YARRABILBA**

PREPARED BY

BUSHLAND PROTECTION SYSTEMS PTY LTD

FOR

LEND LEASE

**PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL**

Approval no: DEV2016/821

Date: 23 June 2017



DATE: 14th December, 2016.

1. Background

A Bushfire Mitigation Plan is designed to identify and minimise the potential bushfire risk to a given property and to help property owners to minimise bushfire risk to themselves, their property and their neighbours. It will not completely eliminate that risk. Ultimately it is a community responsibility to protect the environmental values, life and property in their area.

This plan is a Sub-Precinct Specific Plan for Sub-Precincts 3B & 3C of Yarrabilba, produced in accordance with:

- Bushfire hazard assessment in accordance with the State Planning Policy 7/14, under the Queensland Sustainable Planning Act 2009, based on the Bushfire Assessment Methodology provided by the Public Safety Business Agency (PSBA) & Rural Fire Service Qld (RFSQ).
- Code assessment in accordance with the approved Conceptual Bushfire Risk Assessment and Mitigation Plan (BMP), being the agreed assessment code for the Yarrabilba Project, produced by Bushland Protection Systems, dated 18/7/2012, based on the State Planning Policy 1/03, *Mitigating the Adverse Impacts of Flood, Bushfire and Landslide*, under the Queensland Sustainable Planning Act 2009, the Logan City Council Planning Code Part 5 Bushfire Hazard Area.
- The Context Bushfire Hazard Assessment and Mitigation Plan for Precinct 3 of Yarrabilba produced by Bushland Protections Systems, dated 2/4/16.
- This report also takes into consideration the 'Pre-Development Bushfire Mitigation Concept' Plan prepared by Bushland Protection Systems, dated 30/1/12.

This plan is based on the following material supplied by Lend Lease, and a number of site visits.

- 1.1. A copy of the Yarrabilba Precinct 3 Context Plan, Supplied by Lend Lease, drawing no. YAR_P03_PCP160318, dated 23/3/16, is included as Appendix 1 in this report.
- 1.2. A copy of the Bushfire Hazard Assessment and Management Plan, Sheet 1 of 2, drawn by RPS, drawing no. 106127-132b, dated 14/12/16, is included as Appendix 2A in this report.
- 1.3. A copy of the Bushfire Hazard Assessment and Management Plan, Sheet 2 of 2, drawn by RPS, drawing no. 106127-133, dated 14/12/16, is included as Appendix 2B in this report.

2. Description

The overall Yarrabilba site has been used as a pine plantation in the past with operations ceasing some 19 years ago with minimal management since that time, creating considerable pine regrowth, grass and weed growth. Some areas have been hazard reduced by the local Rural Fire Brigade from time to time, although unauthorised ignitions have been responsible for the majority of fires on the site.

Sub-Precinct 3B & 3C consists of residential areas, which will be predominantly cleared for development, and open space areas including both managed and conservation.

Running east-west between Sub-Precincts 3B & 3C is a proposed fauna corridor to be retained as bushland. This corridor is 200 metres in width and connects to the National Park (Plunkett Conservation Park) to the east of Precinct 3. The fauna corridor will eventually consist of grassy eucalypt vegetation over slopes of 5-10%. The corridor would be assigned a Vegetation Hazard Class (VHC) of 9.2 with associated fuel loads of up to 17.2t/Ha, over slopes of up to 5 degrees with an FFDI of 54, providing for a potential fire line intensity of up to 13,985kw/m equating to a Medium hazard rating.

Running north-south along the western edge of Sub-Precincts 3B & 3C is an open space waterway corridor to be retained predominantly as bushland. The corridor will vary in width from 130 to 250 metres and follows a shallow water flow path, with relatively level slopes of approximately 1 degree. The eventual bushland would be assigned a Vegetation Hazard Class (VHC) of 16.1 with associated fuel loads of up to 15.9t/Ha, over relatively level land with an FFDI of 54, providing for a potential fire line intensity of up to 9,069kw/m equating to a Medium hazard rating.

To the north of Sub-Precinct 3C is the Wickham Timber Reserve, consisting of grassy eucalypt vegetation. The area adjacent to Sub-Precinct 3C, on the neighbouring site, is upslope of the proposed residential area, with a southwest aspect. The timber reserve would be assigned a VHC of 36.1 with associated fuel loads of up to 26t/Ha, upslope with an FFDI of 54, providing for a potential fire line intensity of up to 22,632kw/m equating to a High hazard rating (see Table 1).

To the east of Sub-precincts 3B & 3C is a National Park – Plunkett Conservation Park. The National Park consists of grassy eucalypt vegetation, upslope of the Yarrabilba site with a west to southwest aspect. The bushland would be assigned a VHC 9.2 with associated fuel loads of up to 17.2t/Ha, upslope with an FFDI of 54, providing for a potential fire line intensity of up to 9,905kw/m equating to a Medium hazard rating.

Within Sub-precinct 3C are two narrow corridors. The unmanaged bushland within the majority of these two corridors is less than 100 metres in width. A corridor of less than 100 metre in width with Urban uses either side for a minimum of 25 metres, is downgraded to a Low/No hazard under corridor and patch filtering (CSIRO report, Section 2.2.1) due to not being of sufficient size to carry a significant bushfire. Appendix 2A of this report shows the downgraded sections of the corridors. The eastern ends of the corridors where they widen out to more than 100 metres in width would be assigned a VHC of 9.2 with associated fuel loads of up to 17.2t/Ha, over slopes of up to 5 degrees with an FFDI of 54, providing for a potential fire line intensity of up to 13,985kw/m equating to a Medium hazard rating.

The power line easement area to the south is to be managed by regular slashing in accordance with the approved Concept BMP. The buffer area between the allotments and the power line easement is also to be a managed area, as outlined in Section 6 of this report, having a maximum VHC 39.2 with associated fuel loads of up to 8t/Ha, over slopes of up to 1 degrees with an FFDI of 54, providing for a potential fire line intensity of up to 2,296kw/m equating to a 'Not Bushfire Prone Area' rating.

Table 1

POTENTIAL HAZARD CLASS	POTENTIAL FIRELINE INTENSITY
Not Bushfire Prone Area (Low)	<4,000 kw/m
Medium	4,000 to 20,000 kw/m
High	20,000 to 40,000 kw/m
Very High	>40,000 kw/m

The Bushfire Hazard Mapping also incorporates a 100 metre Potential Impact Buffer meaning that any land within 100 metres of a Potential Bushfire Hazard is also assigned the same rating as that bushland and triggers the Bushfire Code if Medium, High or Very High. Whilst having the same distance for all three levels of hazard is not considered a fit for purpose application, it is unfortunately what is legislated at this current time. Therefore proposed Lots 260-263, 285-288, 290-294, 303-312, 319-323, 373-384, 395, 396, 410-414, 443-446, 525-527, 570-574, 576-584, 587-596, 611-619, 630-647, 650-664, 668-682, 685-709, 719-738, 740-743, 752-755, 760-782, 785-794, 801-816, 820-839, 852-865, 871-876, 915-939, 945, 970-1013, 1016-1035 & 1040-1055 would be subject to a bushfire hazard rating being within the potential impact buffer zone.

Appendix 2A provides a visual representation of the bushland areas assessed as being a potential bushfire hazard area and those downgraded. It also shows the potential impact zone for allotments requiring bushfire measures.

3. Appropriate Building Location & Managed Buffers

As the site is relatively level to undulating topography, there are no significant steep slopes causing dwellings to be located along ridgelines or the like. The developable area is on the lower slopes, where future dwellings will not be exposed to significant upslope bushfire approach.

Being a residential community, it would be recommended that dwellings be located on allotments so as to maximise setbacks from any unmanaged bushland, allowing for optimal defensible space.

In accordance with the approved Concept Bushfire Risk Assessment and Mitigation Plan, dwellings are to have a minimum bushfire buffer of 20 metres or the distance required to achieve a Bushfire Attack Level BAL-29 (as identified under AS3959), whichever is the greater, from large bushland areas and corridors over 100 metres in width. This includes the east-west fauna corridor, the north-south waterway corridor, the Wickham Timber Reserve and the National Park. Therefore:

- Buffers shown in Blue on Appendix 2A have been provided to ensure a minimum separation of 20 metres between BLE's and the bushfire hazard rated bushland, when combined with minimum in-lot setbacks and road reserve widths (where road separation has been provided).
- The future dwellings on Lots 1027-1035, 1040-1044 & 1052-1055 are to have a minimum setback from the northern boundary so as to provide a total 20 metre separation from the Wickham Timber Reserve boundary.

In accordance with the approved Concept Bushfire Risk Assessment and Mitigation Plan, dwellings are to have a minimum bushfire buffer of 10 metres, or the distance required to achieve a Bushfire Attack Level BAL-29 (as identified under AS3959), whichever is the greater from narrow corridors and small areas of bushland. The narrow corridors in Sub-precinct 3C are downgraded to Low therefore a 10 metre separation is the maximum required, which has been provided by road separation and the buffer to Lots 1051 & 1053-1055, as shown in Appendix 2A.

All dwellings have been provided their minimum separation distances from hazardous bushland in accordance with the approved Concept Bushfire Risk Assessment and Mitigation Plan.

4. Roads, Driveways and Fire Trails

As with any proposed development of this size, it will have a substantial road network. Roads in the area will provide for multiple access/egress options for the proposed development. It is considered that access/egress is highly unlikely to be restricted by bushfire.

The internal roads are all loop roads and through roads, with the only cul-de-sac road being a short road approximately 80 metres long servicing only 3 Lots (Lots 1053-1055). There are connections provided to existing and future precincts, as well as links to the existing fire trail network.

Being residential allotments, the dwellings will have short direct driveway access.

There is an existing fire trail network in place within the adjoining Wickham Timber Reserve to the north and the National Park to the east. A fire trail connection is provided to the fire trail network within the Wickham Timber Reserve adjacent to Lot 1027. Connections to the east are also to be provided in the general vicinity of Lots 580, 765, 934, & 992, providing strategic connection to the existing fire trail network, enabling optimised bushfire suppression opportunities and hazard reduction options.

In many parts of the of the development the fire trail within the National Park is along the adjoining boundary providing additional separation and access between the proposed allotments and unmanaged bushland, as can be seen in Appendix 2A.

A fire trail is to be established and maintained within the buffer area, on the southern side of Lots 830 & 915-925, with connections to the roadways at each end.

A fire trail is to be established and maintained within the buffer area, wrapping around Lots 1051 & 1053-1055, with connections to the roadways at each end.

Fire Trails are to be 6 metres in cleared width with 4 metres formed. They would be low impact preferably with a mowed or slashed surface which would minimise disturbance or erosion, Appendix 4 on fire trails is included in this report as a guide on establishing and maintaining fire access trails. Maintenance of fires trails is the responsibility of the owner of the land on which they are located.

5. Appropriate Building Construction

The bushfire provisions of the Building Code of Australia (BCA) are applied to Class 1, 2 & 3 buildings and associated Class 10a buildings, located in designated bushfire prone areas. “Designated bushfire prone area means land which has been designated under a power in legislation as being subject, or likely to be subject, to bushfires” (*BCA 1.1.1 Definitions*).

The Logan Planning Scheme 2015 v2.0., Table 5.7.1 – Building Work, Editor’s note, states “*Land identified in a bushfire hazard area on Bushfire hazard overlay map-OM-03.00 is a designated bushfire prone area for the Building Code of Australia and the Queensland Development Code.*” OM-03.00 only maps areas of Very High, High or Medium Potential Bushfire Hazard (PBH).

As Lots 260-263, 285-288, 290-294, 303-312, 319-323, 373-384, 395, 396, 410-414, 443-446, 525-527, 570-574, 576-584, 587-596, 611-619, 630-647, 650-664, 668-682, 685-709, 719-738, 740-743, 752-755, 760-782, 785-794, 801-816, 820-839, 852-865, 871-876, 915-939, 945, 970-1013, 1016-1035 & 1040-1055 are assigned bushfire rating, as outlined in Section 2 of this report, these allotments require the Building Code of Australia (BCA) and where relevant the Australian Standard for Construction of Buildings in Bushfire-Prone Areas (AS3959) to be addressed.

P2.3.4 of the BCA requires:- “A Class 1 building or a Class 10a building or deck associated with a Class 1 building that is constructed in a designated bushfire prone area must be designed and constructed to reduce the risk of ignition from a bushfire while the fire front passes.”

Section 3.7.4.0 (Qld variation) of the BCA states:-

(a) Subject to (b), Performance Requirement P.2.3.4 is satisfied for—

- (i) a Class 1 building; or*
- (ii) a Class 10a building or deck associated with a Class 1 building, located in a designated bushfire prone area if it is constructed in accordance with—*
- (iii) AS 3959; or*
- (iv) NASH Standard – Steel Framed Construction in Bushfire Areas.*

(b) The requirements of (a) do not apply when, in accordance with AS 3959, the classified vegetation is Group F rainforest (excluding wet sclerophyll forest types), mangrove communities and grasslands under 300 mm high.

The following levels of construction (as shown in Appendix 2B) are reliant on the recommendations of this report being implemented and maintained.

Where the bushland is upslope of the allotments, a minimum separation of 20 metres has been provided; In accordance with AS3959-2009 – Table 2.4.5 ‘*Determination of Bushfire Attack Level (BAL)-FDI 40 (1090K)*’, the vegetation class is woodland, distance from unmanaged vegetation is between 19 and 100 metres and slope is upslope, which equates to a BAL-12.5 Bushfire Attack Level for the proposed dwelling. A BAL-12.5 Bushfire Attack Level requires Sections 3 and 5 of AS3959-2009 to be applied.

Where the bushland is downslope of the allotments; In accordance with AS3959-2009 – Table 2.4.5 ‘*Determination of Bushfire Attack Level (BAL)-FDI 40 (1090K)*’, the vegetation class is woodland and slope is 0-5 degrees. The distance between the building and the hazardous vegetation line (as shown in Appendix 2B) will determine the standard of construction required.

- If the distance between the building and the hazardous vegetation line is between 16 and 23 metres, the Bushfire Attack Level for the proposed dwelling will equate to BAL-19. A BAL-19 level requires Sections 3 and 6 of AS3959-2009 to be applied.
- If the distance between the building and the hazardous vegetation line is between 23 and 100 metres, the Bushfire Attack Level for the proposed dwelling will equate to BAL-12.5. A BAL-12.5 level requires Sections 3 and 5 of AS3959-2009 to be applied.

5.1. Lots 690-703, 709, 726, 765-769, 774-782, 934-938, 1003 & 1004

Lots 690-703, 709, 726, 765-769, 774-782, 934-938, 1003 & 1004 have a minimum 20 metre separation between the BLE and the bushland to the north. If the dwelling is located within 3 metres of the northern BLE boundary, then the dwelling will have a BAL-19 construction rating. If the dwelling is located 3 metres or more from the northern BLE boundary then the dwelling will have a BAL-12.5 construction rating.

5.2. Lots 809-816, 820-829, 927-933, 991 & 992

Lots 809-816, 820-829, 927-933, 991 & 992 have a minimum 20 metre separation between the BLE and the bushland to the south. If the dwelling is located within 3 metres of the southern BLE boundary, then the dwelling will have a BAL-19 construction rating. If the dwelling is located 3 metres or more from the southern BLE boundary then the dwelling will have a BAL-12.5 construction rating.

5.3. Lots 993-998

Lots 993-998 have a minimum 20 metre separation between the BLE and the bushland to the southeast. If the dwelling is located within 3 metres of the south-eastern BLE boundary, then the dwelling will have a BAL-19 construction rating. If the dwelling is located 3 metres or more from the south-eastern BLE boundary then the dwelling will have a BAL-12.5 construction rating.

5.4. Lots 260-263, 285-288, 290-294, 303-312, 319-323, 373-384, 395, 396, 410-414, 443-446, 525-527, 570-574, 576-584, 587-596, 611-619, 630-647, 650-664, 668-682, 685-689, 704-708, 719-725, 727-738, 740-743, 752-755, 760-764, 770-773, 785-794, 801-808, 830-839, 852-865, 871-876, 915-926, 939, 945, 970-990, 999-1002, 1005-1013, 1016-1035 & 1040-1055

These allotments have the minimum separations required to achieve a BAL-12.5, requiring Sections 3 & 5 of AS3959-2009 to be applied.

It should be noted that Lots 285, 395, 525, 527, 733-738, 871, 945, 979 only have a small portion of the allotment rated as bushfire hazard (see Appendix 2B). If the dwelling is located outside the potential impact zone, then the dwelling would have over 100 metres separation and therefore be assigned a BAL-LOW. Section 4 of the AS3959-2009 states “*The Bushfire Attack Level BAL-LOW is based on insufficient risk to warrant specific bushfire construction requirements.*”, therefore no specific requirements for construction are required in regard to bushfire.

5.5. Remaining Allotments

The remainder of the allotments in Sub-Precinct 3B & 3C (not identified in Sections 5.1 to 5.4 above) have a Low PBH rating.

Under the Logan Planning Scheme 2015 v2.0., Table 5.7.1 – Building Work, Editor’s note, a site with a Low PBH rating does not require assessment under the Building Code of Australia or under the Australian Standard (AS3959) for *Construction of Buildings in Bushfire Prone Areas* and therefore no specific level of construction would be required in relation to bushfire on these lots.

6. Appropriate Clearing and Landscaping

The residential allotments are to be maintained with low ground fuel levels at all times and may include domestic gardens, lawns with grass kept under 100mm in height and scattered trees with discontinuous canopy.

The retained bushland along the fauna corridor and waterway corridor are to be managed by the removal of weed species and control of non-endemic grass growth. All slash pine is to be removed from the site including within the retained bushland areas and future regrowth slash pine is also to be removed.

The park area in the north east corner of Sub-precinct 3B and the park areas in Sub-precinct 3C (adjacent Lots 959 & 844) are to be managed parkland areas of predominantly open mowed lawn and small pockets of landscaping. Landscaped areas can consist of tall canopy tree species and mowed grass under 300mm high and be managed by removal of tree limbs less than 2 metres high on trees over 4 metre tall, removal of weed growth & slash pine, prevention of significant mid-storey vegetation (except the juvenile tall canopy tree species) to prevent ladder fuel structure, removal of fallen timber and by restricting leaf litter build-up to 5t/Ha (approx. 10mm deep). The buffer areas shown in blue on Appendix 2A are also to be managed in the same manner, providing a managed buffer.

As a guide to landscaping and gardening in a bushfire prone area, the document 'Landscaping for Bushfire' produced by the CFA Victoria, is a useful guide on plant selection, garden design and ongoing maintenance. It can be found at <http://www.cfa.vic.gov.au/plan-prepare/landscaping-for-bushfire/>.

The power line easement area to the south is to be managed by regular slashing in accordance with the approved Concept BMP. The buffer area between the allotments and the power line easement is also to be a managed area with landscaping. This area is to consist of tall canopy tree species and mowed grass under 300mm high and be managed by removal of tree limbs less than 2 metres high on trees over 4 metre tall, removal of weed growth & slash pine, grass kept under 300mm high, prevention of mid-storey vegetation (except the juvenile tall canopy tree species) to prevent ladder fuel structure, removal of fallen timber and by restricting leaf litter build-up to 5t/Ha (approx. 10mm deep). This management will attribute a VHC 39.2 for the area which provides a Low hazard rating as outlined in Section 2 of this report.

In bushland areas, the areas around the fringes of the bushland and along fire trails have a tendency to have increased ground fuel loading, as a result of increased sunlight penetration producing better growing conditions for grass and weeds (known as 'Edge Effects'), which can have an adverse impact on the local ecosystem and safety issues for fire suppression personnel during unplanned fire events. These non-endemic grasses penetrate into the edges of the retained bushland, creating conditions for high intensity fire which damages the edges of the bushland, opening up the canopy which then allows more sunlight in and promotes grass and weed intrusion further into the bushland. This cyclic process has the effect of decreasing the size of quality bushland and increasing grass and weed dominated areas. The most cost effective way to control grass and weed growth is to create a good closed in canopy cover, which will shade out the undesirable species. The control of fuel loads along the edges by regular mowing, brush cutting or in some cases poisoning may be suitable. Areas with a build-up of volatile fuel levels along the open edges of bushland, where full sunlight is available, can be where the most damage is inflicted on the bushland during a bushfire.

Added protection from bushfire can be achieved by establishing green fire breaks which include green lawns, trees arranged to create a shield to catch sparks or fire brands or the expanding of rainforest species. Trees and shrubs not subject to drought stress will cope better during bushfires. The higher the moisture content in the plant the slower it burns. Therefore by keeping the surrounding area green and low in dry ground fuel, the intensity of an approaching fire will be reduced and the risk of spot fires minimised.

For optimal bushfire safety and best practise, the required vegetation management practises for allotments must be established during operational works and maintained by the developer until sold. Once sold the purchaser must maintain the allotment at all times, before, during and after construction of the dwelling.

All land under the control of the developer is to be managed to control ground fuel levels and prevent uncontrolled regrowth, in areas identified as developable in accordance with the Pre-development Bushfire Mitigation Concept plan dated 30/1/12.

7. Provision of Adequate Water Supplies

The area of the proposed development is to be serviced by reticulated water supplies with the inclusion of fire hydrants for firefighting purposes. These services are to comply with the relevant standards as required by the local authorities, including a minimum pressure and flow of 10 litres per second at 200kPa.

8. Provision of Fire Fighting Infrastructure

Dwellings are to have external taps and hoses that are positioned so water supply is capable of reaching to all parts of the building. All water lines are to be covered by at least 300mm of soil or be of metal above ground. Residents should maintain good access around their homes for fire suppression activities by fire authorities.

9. Local Fire Brigades

The subject property is currently in the Tamborine Rural Fire Brigade district and they would be responded on a 000 emergency call, with back-up from Logan Village Rural Fire Brigade. If further back-up is required, additional units would be engaged by the Beaudesert/Logan Rural Fire Brigades Group. Urban fire appliances would be responded in the event of a structural fire or specialised structural protection being required.

In time as urban development progresses in this area it will most likely become the responsibility of the Urban Fire Service.

10. Improved Community Awareness

Managing ground fuel in small pockets of bushland at the interface between urban development and bushland (Izone) is the easiest way of reducing bushfire hazard, particularly the removal of non-endemic grass and weeds.

It would be recommended that a copy of this report be placed on display at any sales office, and a copy of the plans including Appendix 3 on being prepared, be given to the purchasers of lots within 100 metres of bushland areas to provide them with the necessary information required for the building application process.

It would be recommended that residents prepare a 'Bushfire Survival Plan', which is available from the Rural Fire Service Queensland website at www.ruralfire.qld.gov.au. The 'Bushfire Survival Plan' document provides information on Bushfire Danger Ratings, Community Warning Information, how to prepare your property, what to do in the event of a bushfire and what to expect. The Bushfire Survival Plan should be updated annually. Further information is also available through the Prepare•Act•Survive brochure also available on the Rural Fire Service website. For further information contact your local Fire Brigade for assistance or phone 1300 369 003.

The Bushland open space is a very sensitive ecosystem and could be altered drastically if not cared for properly. Residents can assist in maintaining this fragile ecosystem by preventing unwanted fires from encroaching into the parkland, ensure that dumping of rubbish does not degrade the area and that exotic plant species do not invade the bushland. Hot fires on a regular basis will degrade the bushlands biodiversity.

11. Conclusion

This plan is a Sub-Precinct Specific Plan for Sub-Precincts 3B & 3C of Yarrabilba, produced in accordance with:

- Bushfire hazard assessment in accordance with the State Planning Policy 7/14, under the Queensland Sustainable Planning Act 2009, based on the Bushfire Assessment Methodology provided by the Public Safety Business Agency (PSBA) & Rural Fire Service Qld (RFSQ).
- Code assessment in accordance with the approved Conceptual Bushfire Risk Assessment and Mitigation Plan (BMP), being the agreed assessment code for the Yarrabilba Project, produced by Bushland Protection Systems, dated 18/7/2012, based on the State Planning Policy 1/03, *Mitigating the Adverse Impacts of Flood, Bushfire and Landslide*, under the Queensland Sustainable Planning Act 2009, the Logan City Council Planning Code Part 5 Bushfire Hazard Area.
- The Context Bushfire Hazard Assessment and Mitigation Plan for Precinct 3 of Yarrabilba produced by Bushland Protections Systems, dated 2/4/16.
- This report also takes into consideration the 'Pre-Development Bushfire Mitigation Concept' Plan prepared by Bushland Protection Systems, dated 30/1/12.

With the appropriate management of the passive open space areas, adequate water supply, good access provisions and minimising of ground fuels, the risk of bushfire damage can be managed and improve the safety of residents and fire services in attending to a bushfire threat, as well as maintaining the localised ecosystems.

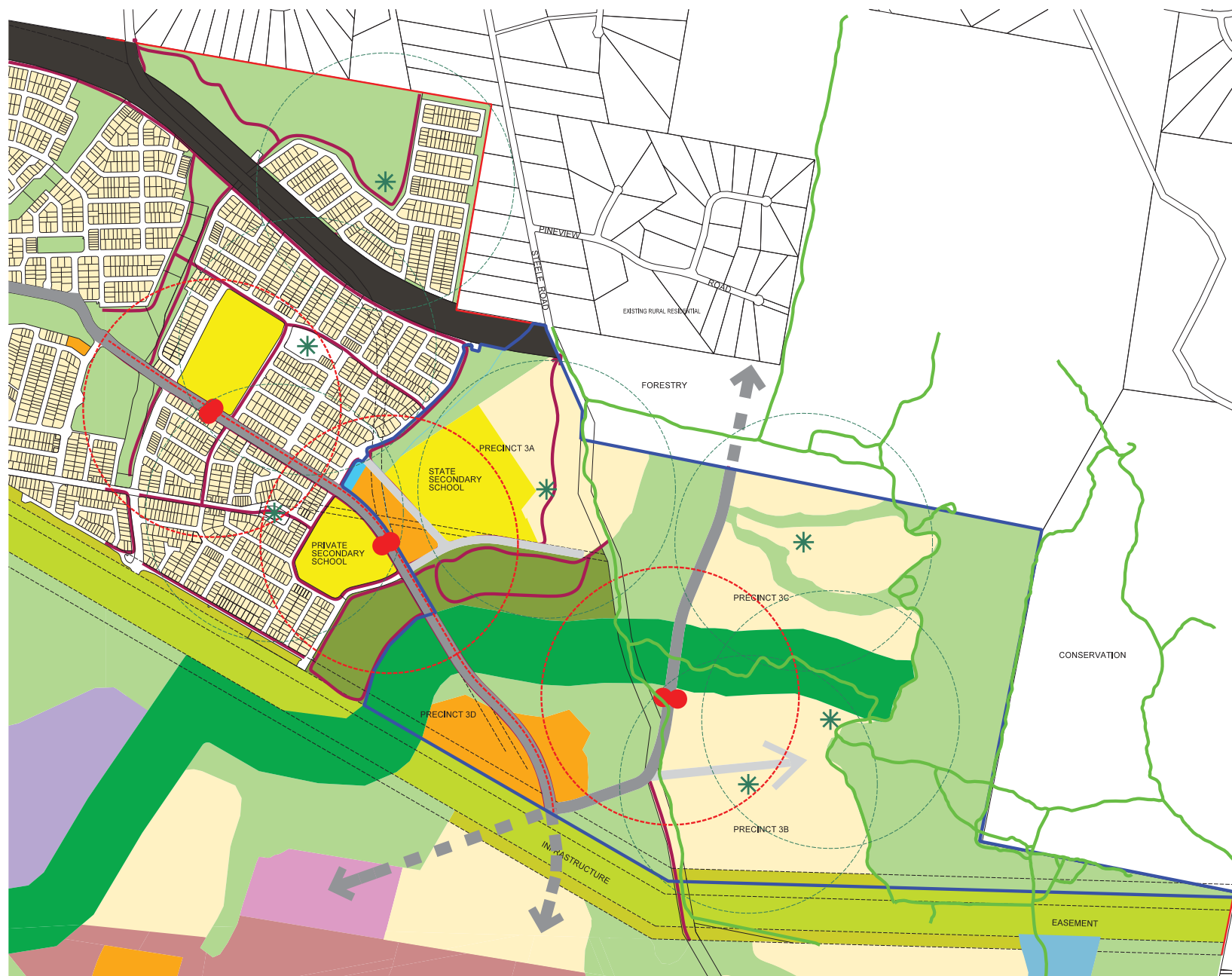
This plan should remain current for a period of 5 years, until 2021, at which time it should be subject to review to take account of changing land use and vegetation patterns. Any major bush fire event affecting the subject site should also trigger a review in order to determine effectiveness of protection measures and annual hazard reduction initiatives.

Ultimately, persons living in a bushfire prone area must take the precautions necessary to protect themselves, their families and their homes if Brigades are stretched and are unable to attend immediately.

If you require any further assistance please do not hesitate to contact this office.



C. L. Bain
Principal Consultant.



- LEGEND**
- YARRABILBA SITE BOUNDARY
 - PRECINCT THREE BOUNDARY
 - ROAD TO BE CLOSED
 - NEIGHBOURHOOD CENTRE
 - RESIDENTIAL
 - URBAN RESIDENTIAL
 - EDUCATIONAL ESTABLISHMENT
 - RETAIL/COMMUNITY/COMMERCIAL INFRASTRUCTURE/MIXED USE
 - FORNA CORRIDOR
 - OPEN SPACE
 - MAJOR SPORTS PARK
 - * NEIGHBOURHOOD RECREATION PARK & 400m RADIUS LOOP
 - ELECTRICITY EASEMENT
 - LANDSCAPE BUFFER
 - SOUTHERN INFRASTRUCTURE CORRIDOR
 - PRIMARY MOVEMENT NETWORK
 - SECONDARY MOVEMENT NETWORK
 - BUS ROUTE
 - * BUS STOP/PROPOSED BUS STOP & 400m RADIUS LOOP
 - EXISTING TRAILS

TOTAL PRECINCT AREA	254 ha
GROSS RESIDENTIAL AREA	67ha
Approx 950 lots at an average density of 15dw/ha	
NEIGHBOURHOOD CENTRE	0.5
COMMUNITY CENTRE	11.0ha
STATE SECONDARY SCHOOL	12.0ha
OPEN SPACE	157.0ha
ROAD	7.0ha

DISCLAIMER
The context plan is intended to guide development within the Yarrabilba Precinct Two area and show the preferred land use designations and structural elements. The context plan does not prescribe these designations and structural elements with complete accuracy and the final location will be determined through further detailed design and development applications.

NOTES
The contents of this plan are conceptual only. All areas are approximate only and subject to relevant studies, survey, engineering and relevant authority approvals.

YARRABILBA - PRECINCT THREE CONTEXT PLAN

NOTE: This plan is indicative only, and specific uses, road alignment, boundaries, setbacks, and building layout shown may vary due to detailed design consideration. ©2015 Lend Lease Communities (Australia). All rights reserved. Except as permitted by Lend Lease, no part of this publication may be reproduced or distributed in any form or by any means, or stored in a database or retrieval system, without the permission of Lend Lease.



Legend

- Precinct 3B/C Boundary
- Low/No Bushfire Hazard
- High/Medium Bushfire Hazard
- 100m Impact Buffer Zone
- Fire Break Zone
- Local Recreational Park
- Neighbourhood Recreation Park
- Council Park
- Conservation Open Space
- National Park



NOTE:
The boundaries shown hereon are subject to detailed engineering design, final survey and approval of subsequent permits as necessary.

All residential lots and roadways have a Low Potential Bushfire Intensity rating.

Prepared by RPS on behalf of Bushland Protection Systems March 2017.

PRECINCT THREE – VILLAGE 3B & 3C (APPLICATION TWO) BUSHFIRE HAZARD ASSESSMENT & MANAGEMENT PLAN - Sheet 1 of 3

NOTE: This plan is indicative only, and specific uses, road alignment, boundaries, setbacks, and building layout shown may vary due to detailed design consideration. © 2015 Lend Lease Communities (Australia). All rights reserved. Except as permitted by Lend Lease, no part of this publication may be reproduced or distributed in any form or by any means, or stored in a database or retrieval system, without the permission of Lend Lease.

0 100 200 300 400 500m
Scale 1:7,500 at A3

North



Legend

- Precinct 3B/C Boundary
- BAL - 12.5 Rating
- BAL - 19 Rating
- Lots include larger side setback
- Fire Break Zone
- Hazardous Vegetation Line
- Local Recreational Park
- Neighbourhood Recreation Park
- Council Park
- Conservation Open Space
- National Park



NOTE:
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All residential lots and roadways have a Low Potential Bushfire Intensity rating.

Prepared by RPS on behalf of Bushland Protection Systems March 2017.

PRECINCT THREE – VILLAGE 3B & 3C (APPLICATION TWO) BUSHFIRE HAZARD ASSESSMENT & MANAGEMENT PLAN - Sheet 2 of 3

NOTE: This plan is indicative only, and specific uses, road alignment, boundaries, setbacks, and building layout shown may vary due to detailed design consideration. © 2015 Lend Lease Communities (Australia). All rights reserved. Except as permitted by Lend Lease, no part of this publication may be reproduced or distributed in any form or by any means, or stored in a database or retrieval system, without the permission of Lend Lease.

0 100 200 300 400 500m
Scale 1:7,500 at A3



APPENDIX 3

Being Prepared

Knowing how to prepare your property for bush fire, both pre-fire and during a fire, can assist in protecting people and property. It can also alleviate a lot of the stress and panic and the feeling of helplessness that is commonly felt by the inexperienced and by the ill-prepared.

It is generally accepted that South East Queensland does not experience the same degree of extreme fire conditions as the southern states of New South Wales, Victoria and South Australia. Having said this it is also accepted that this State's bushland experiences a relatively regular fire regime. From time to time conditions may occur that will institute a serious and potentially destructive fire. These conditions can be recognised and precautions taken. It must be remembered that during extreme fire conditions the fire services may be stretched to the limit and may not be able to respond immediately to your particular emergency. Fire trucks and fire fighters are a limited resource so it is important that they are deployed in an appropriate manner to best manage the fire. The Queensland Fire and Rescue Service do not guarantee a fire truck will be available to defend every structure during a large bushfire. So it would be desirable to be as prepared and self-reliant as possible to protect yourself, your family and your assets. It is not difficult if appropriate preparation is undertaken and the following information is provided to be of some assistance.

1. Conditions that may lead to a Serious Fire:

- 1.1. Higher than average air temperatures for prolonged periods.
- 1.2. Large and very dry fuel loads.
- 1.3. Prolonged dry spell with little or no rain resulting in low soil moisture content.
- 1.4. Very low relative humidity, ie. there is very little moisture in the air.
- 1.5. Strong and gusty winds, usually from the north through to the west contribute to increased fire hazard. The longer these winds continue the drier the conditions become, and the higher the risk of serious fire.

Observation of local weather conditions past and present will give the best indication of the potential intensity of a fire at any given time or place.

Notification of potential bushfire conditions are available from the Queensland Rural Fire Service and Local Brigades, in the form of Fire Danger Ratings often seen on roadside signs, Advice Messages, Watch and Act Messages and Emergency Warnings. More information on these information sources, where to find them and what they mean, is available on the Rural Fire Service Website www.ruralfire.qld.gov.au or through the local Fire Brigade.

2. Basic Fire Behaviour.

Having some idea of what a fire is likely to do in your local area, will help you make the right decisions and give you the confidence to deal with an approaching fire if necessary. Following are some basic fire behaviours.

- 2.1. Fire will travel faster and hotter uphill. The steeper the slope the faster the rate of spread, in some cases allowing little time to react. The speed of a fire will double for every 10 degrees of upslope.
- 2.2. Fire will usually travel relatively slower down hill even with reasonably high fuel loads, which will give more time to prepare. The speed of a fire will halve for every 10 degrees of down slope.
- 2.3. A fire will generally travel faster and at higher intensities with a wind behind it. The stronger the wind, the faster the rate of spread. Likewise a fire will slow considerably when burning against the wind in some cases it may even go out.
- 2.4. The fire will usually burn at a higher intensity and spread faster during the hottest times of the day and tend to slow down considerably as the evening approaches and air temperatures drop.
- 2.5. The greater the supply of dry ground fuel available to the fire, ie. grass, dry leaf litter, hanging bark and twigs, the greater the intensity of the fire. If the ground fuel is minimised the intensity of the fire reduces considerably and so does the personal risk and the potential for damage.
- 2.6. If ground fuels are kept relatively low the chances of a fire progressing into the treetops (crown fire) would be considerably reduced within the Queensland coastal bushlands. For a fire to progress into the tree tops ground fuels and elevated fuels must be present providing a 'ladder' of fuels from ground level to tree top. Control of these fuels is the best way of minimising fire intensity and therefore limiting the destructiveness of a bushfire.

Talk to neighbours that have been present during previous bushfires or consult the local Fire Brigade to develop an understanding of usual fire behaviour for your specific location.

3. Preparing for the bushfire season.

Most cases of damage to property are caused by radiated heat, direct flame contact or most commonly by burning debris or sparks landing in, on, or around buildings and starting small spot fires which if not attended to may destroy the property long after a fire front has passed. There are many steps that should be taken prior to the onset of a fire season to help protect your property.

- 3.1. Keep ground fuel cleared from around buildings such as long dry grass, branches, dead leaves, bark and thick undergrowth.
- 3.2. Remove elevated fuels, such as hanging bark and fallen debris hung up on lower branches.

- 3.3. Ensure fire breaks/trails/buffers are checked and maintained, even a well-watered lawn can be an effective firebreak.
- 3.4. Flammable material around buildings should be kept well clear, such as firewood piles, rubbish, fuels, hazardous materials, plant pots, boxes, paper, patio and garden furniture.
- 3.5. Ensure flammable materials are not stored in open areas under the building.
- 3.6. Make sure that rainwater gutters are kept clear of leaf litter build-up. Consider a method of blocking off down pipes so gutters can be filled with water during a fire to extinguish sparks landing in gutters. There are commercially made products available or you can create your own.
- 3.7. Make sure that the roofing is well secured, as winds created during a fire may lift roofing and allow the entry of burning embers into the roof space. Also clear any leaf litter or debris build-up from roof areas.
- 3.8. All windows and vents should be screened with fine wire mesh and all roof areas closed in to prevent entry by sparks.
- 3.9. Ensure gas tanks have their emergency relief valves facing away from the building (this includes barbeque bottles).
- 3.10. Make sure of reserve water supplies. Power frequently fails during a fire. If petrol or diesel pumps are available make sure they and associated hoses and fittings are in good working order.
- 3.11. Ensure your bushfire survival kit is up to date and complete.

The Queensland Fire and Rescue Service provide detailed lists for preparation prior to fire season and what to do during a bushfire event. This information can be found at www.ruralfire.qld.gov.au or obtained from your local fire brigade.

4. Green Fire Breaks

Added protection from bushfire can be achieved by establishing green fire breaks which include green lawns, trees arranged to create a shield to catch sparks or fire brands or the expanding of tropical rainforest species. Excess rainwater or tertiary treated waste water could be stored and used for this purpose during dry periods to maintain the green fire breaks. Trees and shrubs not subject to drought stress will cope better during bushfires. The higher the moisture content in the plant the slower it burns. Therefore by keeping the surrounding area green and low in dry ground fuel, the intensity of an approaching fire will be reduced and the risk of spot fires minimised.

5. Personal Protection

- 5.1. If you plan to evacuate, make sure you do so early, long before the fire front arrives. Evacuating at the very last moment results in the majority of deaths at bushfires. People remaining to fight the fire need to be physically and mentally fit to do so.

5.2. Those staying to protect the property should make sure they protect themselves from radiant heat, flying embers, smoke and most importantly heat stress.

Protection measures should include the following:

- Long trousers and long sleeve shirt made of wool, denim or cotton (no synthetics)
- Woollen socks and sturdy work boots for foot protection
- Goggles for eye protection
- A good pair of work gloves to protect hands from burns
- A smoke mask or a damp cloth (non-synthetic), to cover your nose and mouth to protect you from inhaling smoke and embers.
- Have plenty of drinking water available to protect against dehydration (not refrigerated as this can cause cramping).

5.3. During the fire

When a fire is approaching and given that you have already carried out your pre-fire precautions, established adequate buffers, implemented mitigation measures and established the degree of risk to your property, protection from the actual fire should be relatively straight forward.

5.3.1. Dress in the appropriate clothing and be sure to drink water regularly.

5.3.2. Fill up bathtubs, sinks, buckets, laundry tubs etc. in case of blackouts.

5.3.3. Close doors and windows.

5.3.4. Close gaps under doors and windows with wet towels.

5.3.5. Block up down pipes, wet down roof, walls and gardens, paying particular attention to the side the fire is approaching from.

5.3.6. Have a battery-powered radio on hand to listen for information about the fire's progress from local radio stations.

5.3.7. Patrol your property while the fire is approaching and take shelter inside as the fire front passes. Then continue patrolling the property for many hours after it has passed, to ensure that any spot fires or smouldering debris do not get a chance to develop into a major fire, paying particular attention to the roof cavity of your buildings. Smouldering embers have been known to start fires hours or even days after the initial passing of the bushfire front.

The Queensland Fire and Rescue Service provide detailed lists for preparation prior to the arrival of a bushfire and what to do during a bushfire event. This information can be found at www.ruralfire.qld.gov.au or obtained from your local fire brigade.

6. Further Information?

The local fire brigade is a good source of local district knowledge, they also have pamphlets and literature produced by the Queensland Fire and Rescue Service available. Most brigades will also be happy to advise local residents.

The information provided above is only a basic guide. Further and more details information is available from the Queensland Fire and Rescue Service. It would be recommended that residents in bushfire prone areas prepare a 'Bushfire Survival Plan', which is available from the Queensland Rural Fire Service website at www.ruralfire.qld.gov.au. The 'Bushfire Survival Plan' document provides information on Bushfire Danger Ratings, Community Warning Information, how to prepare your property, what to do in the event of a bushfire and what to expect. The Bushfire Survival Plan should be updated annually. Further information is also available through the Prepare•Act•Survive brochure also available on the Rural Fire Service website. For further information contact your local Fire Brigade for assistance or phone 1300 369 003.

APPENDIX 4

Recommendations for Fire Trails

Fire trails can be a very effective tool in the management of bushland, for weed control, hazard reduction requirements, prescribed burns and fire suppression activities. A good well maintained trail network can effectively enhance and maintain desired ecosystems, while providing added safety for the protection of life and property. The following is some ways in which fire trails can be constructed and maintained to improve their viability.

1. Fire trails should preferably be constructed to a cleared width of 6 metres and a formed width of 4 metres, and be able to be negotiated by light and medium 4 wheel drive fire appliances.
2. They should preferably have a maximum gradient of 25%, a maximum cross slope of 5%, avoid large cut and fill and avoid sharp corners.
3. Fire trails up to 25% can be of compacted earth surface designed with water shedding devices, such as pipes under trail, woa boys or change of gradients, to prevent washouts or gouging of slopes. It would also be advantageous in some cases if grass coverage can be established, which with periodic slashing or mowing will assist in preventing washouts.
4. Fire trails should have access at each end and multiple access/egress points where possible.
5. Fire trails are to have passing and turn around areas at maximum intervals of 400 metres.
6. Periodic management of ground fuel levels along the edges of fire trails should be implemented to at least one metre each side to improve accessibility during a fire event.
7. Trees alongside fire trails should have low branches removed to a height of 2 metres to assist in preventing fire from climbing into treetops. Branches overhanging fire trails should be removed to a minimum height of 4 metres to ensure access by fire vehicles.
8. Fire trails should be inspected each year prior to fire season, to ensure their condition and carry out remedial work if required.
9. Dead or dying trees that are close to fire trails and may pose a risk to fire services should be removed.
10. Fire trails should not be seen as fire breaks. They are an aid in the management of fuel levels and fire suppression activities.
11. Fire trails should be identifiable to land managers and fire services by signage and map records. Where a fire trail network exists, intersections should also be identifiable.



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Fire is a part of nature. Its effects can be catastrophic and fire can never be totally eliminated, however there are steps that can be taken to reduce the chances of uncontrolled fires occurring and the risk to life, property and the environment, in the event of uncontrolled fires. This is what we concentrate on, how the threats from bushfire can be minimised. There are many methods to do so, however deciding which method/s is best to use can be a complex decision to make. There are so many factors to consider such as ecological values, biodiversity, fire history, availability of resources, cost effectiveness and public awareness just to name a few. No guarantees can ever be given when dealing with Mother Nature, with ever increasing complexities it has now become a specialist field to be able to create plans to try and minimise the risk from bushfire. Ultimately it is a community responsibility to protect the environmental values, life and property in their area

COMPANY PROFILE

Bushland Protection Systems Pty Ltd (BPS) is a leading Bushfire Management Consultancy firm in Queensland, with many clients, ranging from private landowners to multi-national companies and government bodies.

BPS consultants began operating as Bushfire Management Consultants with the introduction of the Gold Coast Bushfire Management Strategy in 1998 and spread their operations across the state with the implementation in 2003 of the State Planning Policy for mitigating the adverse impacts of flood, bushfire and landslide.

During that time over 2900 projects have been successfully completed, including large residential estates such as Coomera Waters, Spring Mountain, Pacific Pines, Coomera Springs, Observatory, Highland Reserve & Delfin Woodlands as well as commercial or Government project sites such as Paradise Country, Wacol Police Academy, Numinbah Correctional Facility, Silkwood Steiner School, Canon Hill Community Links Project & Griffith University. Clyde Bain, the Principal Consultant, is also one of the two most highly sought after expert witnesses for Land and Environment Court Appeals, in Queensland, having worked as the Bushfire Expert for several Regional and City Councils throughout the state on a number of various projects before the Land and Environment Court.

With a strong background in bush fire fighting and involvement with numerous industry bodies, Bushland Protection Systems continues to deliver realistic and cost effective advice, solutions to provide higher levels of safety for the community, improve wildfire suppression and mitigation options for emergency services and land managers, while maintaining and improving environmental values for the future. All our Consultants are members of the Rural Fire Association of Queensland.